

WHAT IS CLAIMED IS:

1. A method of processing a semiconductor material having a top surface and a bottom surface, the method comprising the steps of:
5 forming a doped region in the top surface of the semiconductor material;
forming a hole in the semiconductor material that extends through the semiconductor material, the hole having substantially anisotropic side walls; and
10 forming a metallic plug in the hole.
2. The method of claim 1 wherein the step of forming a hole includes:
forming a layer of masking material over the top surface of the
15 semiconductor material;
patterning the layer of masking material to expose a region of the top surface of the semiconductor material; and
wet etching the region of the semiconductor material with an etchant to form the hole.
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3. The method of claim 2 wherein the etchant includes ethanol (KOH).
4. The method of claim 2 wherein the etchant includes
25 tetramethylammonium hydroxide (TMAH).
5. The method of claim 2 and further comprising the steps of:
forming a first layer of material on the semiconductor material to line the hole; and

forming a second layer of material on the first layer, the second layer being different from the first layer.

6. The method of claim 5 wherein the first layer of material is
5 a barrier layer, and the second layer of material is a copper seed layer.

7. The method of claim 5 and further comprising the step of
forming a metallic material on the second layer of material to fill up the
hole.

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8. The method of claim 7 and further comprising the step of
removing the first layer of material from the top and bottom surfaces of
the semiconductor material to form a conductive plug in the hole.

15 9. The method of claim 8 and further comprising the steps of:
forming a layer of insulation material on the top surface of the
semiconductor material, the layer of insulation material having a top
surface; and

forming a first opening and a second opening in the layer of
20 insulation material, the first opening exposing the doped region, the
second opening exposing the conductive plug.

10. The method of claim 9 and further comprising the steps of:
forming a first contact structure in the first opening to make an
25 electrical connection with the doped region; and

forming a second contact structure in the second opening to
make an electrical connection with the conductive plug.

11. The method of claim 10 and further comprising the step of forming a layer of metal (metal-1) on the layer of insulation material, the first contact, and the second contact.

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